Plastic Recycling

Why in news?

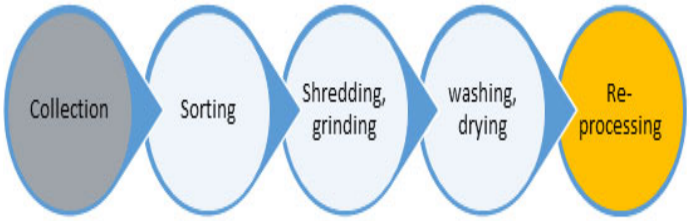
Evidence shows that current recycling practices are insufficient and often counterproductive.

What is plastic recycling?

- **Plastic** – They are a wide range of synthetic or semi-synthetic materials that use polymers as a main ingredient.
- It can be molded, extruded or pressed into solid objects of various shapes.

To date, over 10 billion metric tons of plastic have been produced worldwide, with plastic production increasing by more than 18,300% in the past 65 years.

- **Plastic recycling** - It is the process of *recovering scrap plastic* and *reprocessing it into useful products*.
- **Need** – Most of that plastic ends up *burned, buried in landfills or dumped* in the environment.
- Most plastics are made from petroleum products and are *non-renewable* making it difficult to decompose.
- Thus, recycling can extend the life of these materials and *decrease the need for new production*.
- **Mechanical recycling –** It is the process of recovering plastic waste by mechanical processes such as sorting, washing, drying, grinding, re-granulating and compounding.



- **Chemical recycling** – A process where *plastic is broken down* into its component parts and used to make new materials.
- It complements mechanical recycling processes by enabling the further *extraction of value from polymers* that have exhausted their economic potential for mechanical processing.
    - **For example**: *Gasification, pyrolysis,* hydrothermal treatment
- **Biological recycling** – A process of plastic waste transformation that implicate the action of microorganisms or molecules produced by those in useable resources such as

compost or biogas.

- **Composting** – A process in which organic substance is degraded and stabilised in the *presence of oxygen* through different microorganisms, obtained as a final product compost.
- **Anaerobic degradation** - A process in which the plastic substance is completely degraded in the *absence of oxygen*.
- **Enzymatic recycling** - A process in which plastic materials are *partially degraded* by the action of different enzymes produced principally *by fungus and bacteria*.
    - **For Example**, the *bacteria Ideonella sakaiensis* secretes a notable PETase enzyme that can break down PET plastic.
- **By-products** - Heat, carbon dioxide, water vapor, and humus, like composting.
- **Recyclable plastics** – *PET, or polyethylene terephthalate* can be recycled into new bottles and containers, or it can be turned into other products like carpeting or clothing.
- *High-density polyethylene (HDPE)* is another common type of recyclable plastic.

Category	India	Worldwide
Total Plastic Waste	Approximately 7.4 million tonnes per year (2024)	Approximately 220 million tonnes per year.
Plastic Waste Recycled	Only 8% of its plastic waste	Only around 9% of all the plastic waste generated globally
Plastic Waste Mismanaged	68.62% of generated plastics waste is being mismanaged	Oman tops the list of countries in terms of mismanaged plastic waste.
Single-Use Plastic Ban	Banned selected 19 single-use plastic items with effect from 2022.	Bangladesh became the first country to ban thin plastic bags in 2002.
Per Capita Plastic Waste	15 kilograms per person in 2021.	Global average is around 28 kg.

What are the benefits of plastic recycling?

- **Reduces pollution** - Recycling plastic helps reduce pollution caused by the disposal of plastic waste in landfills and oceans.
- **Reduces waste management costs** - Reducing the volume of waste sent to landfills lowers waste management costs for municipalities.
- **Conserves energy –** It also reduces the need for virgin materials to be used in producing new products, which can conserve resources and save energy.
- **Mitigates climate change** - It reduces the amount of waste plastic sent to landfill, where it can take hundreds or even thousands of years to decompose.
- **Promotes circular economy** - Recycling plastics promotes the concept of a circular economy where materials are reused and recycled, contributing to sustainable development.
- **Create employment opportunities** - Recycling plastic can create jobs in the recycling industry and help to boost the economy.

What are the challenges in plastic recycling?

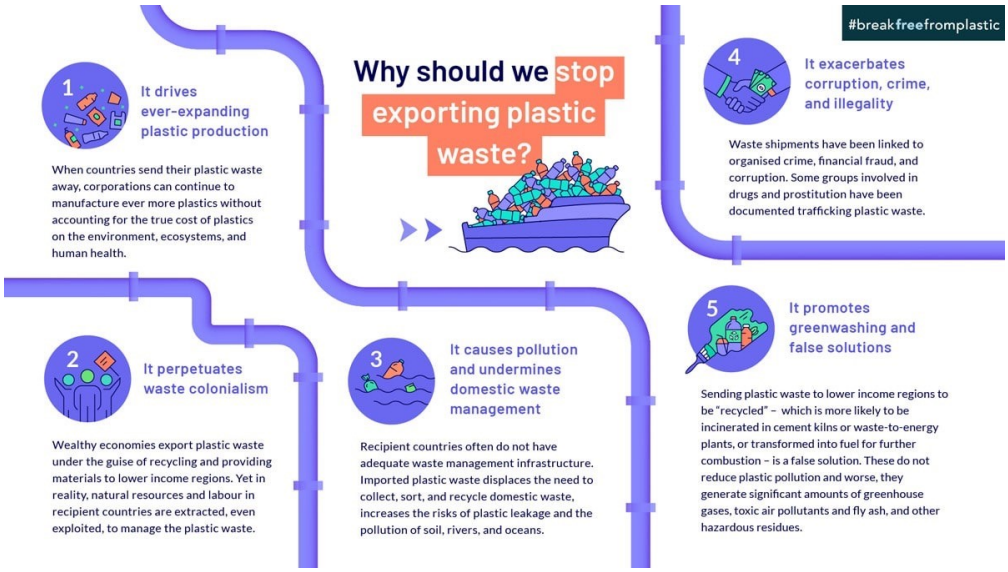
It is estimated that only 9% of all the plastic ever produced has been recycled, with the remaining 91% ending up in landfill or being incinerated.

- **Lack of R&D** - To restore some of the useful properties of recycled plastics, manufacturers often need to mix in virgin plastic and / or toxic additives.
- **Lack of standards** - There is a lack of uniform standards and regulations for plastic recycling, leading to inconsistencies in practices and outcomes.
- **Inefficient waste segregation** – Mixed waste streams often result in contamination, reducing the quality and value of recycled plastic.
- **Lower demand for recycled plastics** – It is due to concerns about quality and performance compared to virgin plastics.
- **Contains toxic materials** - Recycled plastics frequently contain a toxic cocktail of chemicals, making them unsuitable for many applications, particularly food and beverage packaging.

What is plastic waste trade?

Plastic Waste Trade	
	Details
Beginning	It began in 1988.
Definition	It is the international trade of waste between countries for further treatment, disposal, or recycling. 
Global Export Statistics	More than 250 million tonnes have been legally exported across the world.
Impact on Global South	Shifts the burden of plastic waste to the Global South, often becoming dumping grounds.
Environmental Consequences	Plastic waste is frequently burned in the open, releasing toxic pollutants and disproportionately affecting vulnerable communities.
Import in India	India imported around 121,000 metric tons of plastic in 2019, leading to a ban on plastic imports due to environmentalist objections.

Impacts	Import of plastic waste leads to severe environmental and health impacts, including polluted air and water, increased disease rates, and degraded living conditions.
Environmental Injustice	Communities near recovery facilities and recycling plants, typically underserved, face increased health risks including polluted air, soil, and drinking water, frequent fires, and exposure to hazardous materials.



What lies ahead?

- Prioritize reducing plastic production and supporting sustainable, reuse-based solutions.
- Restrict single-use plastics, incentivise reusable alternatives and promote equitable waste management practices.
- Encourage plastic-free habits at individual level in daily life.
- Emphasize on indigenous knowledge to use alternatives for plastics.

References

1. Down To Earth | Plastic recycling
2. Break Free From Plastic report | Paper on plastic waste trade in Asia Pacific
3. Business Standard | Mismanaged plastic waste

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